Using Complex Adaptive Theory to Explain Community Development

Black and African Canadian Communities in Montreal Canada

by

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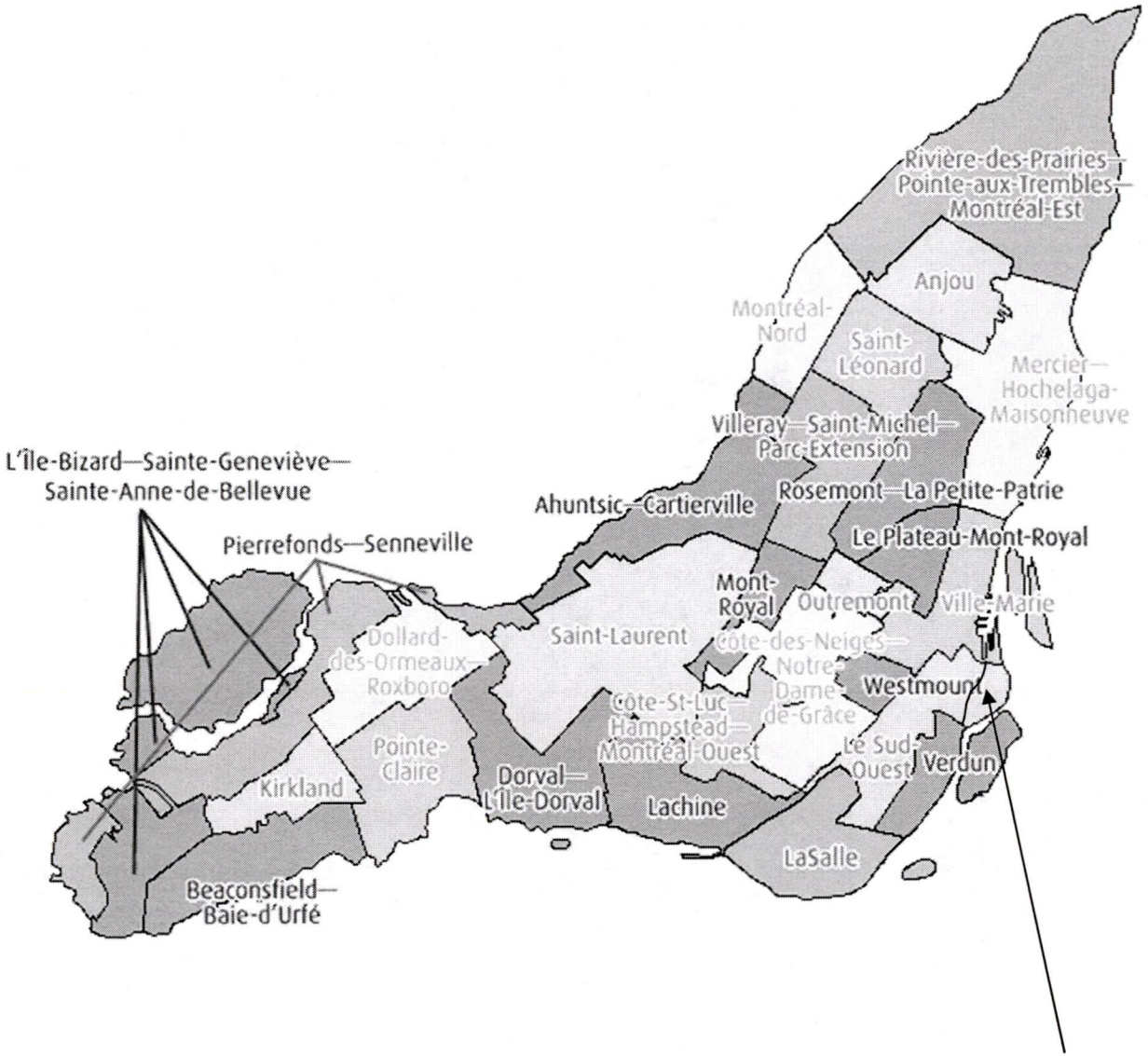
Abstract

- This paper explores the use of complex adaptive systems (CAS) theory to analyze and explain patterns traced by the strategies/actions of sub-populations of cultural minorities as they seek to participate in the social, economic and political life and decision making processes of Quebec and Canada.
- The target cultural sub-population is the English speaking Blacks or sub-populations of African descent in Quebec.
- In this paper Canada and its Provinces are defined as complex adaptive social and economic systems open through immigration, trade, cooperation, and communication network systems to external world societies, governments, and global bio-systems.
- Internally, it is considered to be a fitness landscape that exhibits varying degrees of ruggedness across the country and within its

Diagram 2: MAP OF ISLAND OF MONTREAL



Black Immigration to Montreal Quebec

- Canadian Census 1960 showed that the Black population in the Census Metropolitan Area (CMA) of Montreal was 6000
- Population concentrated in the Little Burgundy district
- Montreal population where the numbers increased from 6 000 in 1960 to 150, 000 by 2006.
- To put it into dramatic relief , the population increased 25 fold between 1960 and the 2001 Census.
- Growth result of immigration mainly from the English speaking Caribbean throughout to the sixties and early seventies.
- From the seventies onward the dominant source of Black immigrants shifted to Haiti.

TABLE 1

Visible Minorities in Montreal (2006)

Visible	City of	Montreal	Montreal
Visible	26%	25%	16.5%
Black	7.7%	7.1%	4.7%
Arab	4.3%	4.1%	2.8%
Latin	3.4%	3.1%	2.1%
South	3.2%	3.3%	2%
Chinese	3%	3%	2%
Southeast	1.9%	1.8%	1.3%
Filipino	1.1%	1.1%	0.7%
West	0.5%	0.6%	0.4%
Multiple	0.4%	0.4%	0.3%
Korean	0.2%	0.2%	0.1%
Not	0.2%	0.1%	0.1%
Japanese	0.1%	0.1%	0.1%

TABLE 2.

Table 7: Black communities in Québec
Economic characteristics
(population 15 years and over)

	Black communities		Total population	
	Number	%	Number	%
Total population 15 years and over	109,140		5,832,350	
In the labour force	72,085	66.0%	3,742,485	64.2%
Employed	59,780	54.8%	3,434,265	58.9%
Unemployed	12,305	17.1%	308,220	8.2%
Worked full year full time (2000)	29,665	42.7%	2,035,000	53.4%
Worked part year (2000) full or part time	39,840	57.3%	1,778,090	46.6%
Population 15 years and over without income	10,845	9.9%	326,105	5.6%
Population 15 years and over with income	98,290	90.1	5,506,245	94.4%

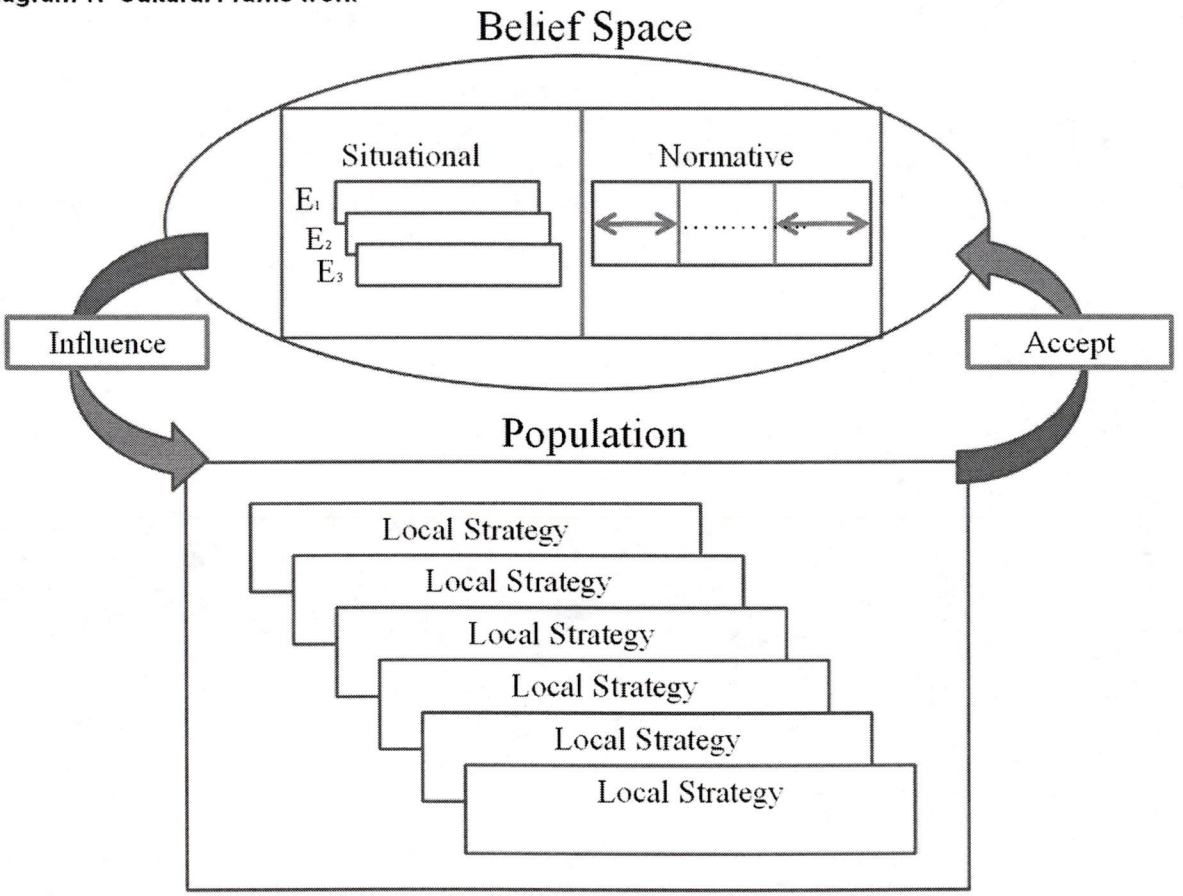
Self Organizing and Adaptive systems

- Social systems are complex and adaptive and self organizing. We may say that it is inherent in the nature of man to have needs/wants and to organize to meet those needs, and wants.
- Our will to live and search for purpose triggers a dynamic social and economic response to fill needs: for survival, perpetuation of family line and specie in general; and improve quality of life.
- Fitness of group increases as numbers are increased : by immigration or reproduction of population. But beyond the increasing opportunities for a long life and sustainable quality and purpose add value to fitness.
- Fitness is defined as a "utility" surface which is not directly observable or measurable: it is implied by the goods produced, consumed and the intensity of the satisfaction of living a meaningful life in a spiritual, social and psychological sense.

Agent-Based Adaptive System Model

- CAS = complex Adaptive systems. Consist of many agents interacting unpredictably to create an emergent system which in turn affect the factors that determine in perpetuity. It is therefore evolutionary anfd co-evolutionary.
- Human social systems are complex adaptive systems
- Kohler-Kobti-Reynolds swam-based-multi- Agent-simulation model :
- Kobti, Z, Reynolds, R, Kohler T, (2003). A Multi-Agent Simulation Using cultural Algorithms: The Effect of Culture on the Resilience of Social Systems",IEEE Congress of Evolutionary Computation, December 5-12, 2003. Canbera Australia.

Diagram 1: Cultural Frame work



Belief Space

- The belief space is like the brain of a complex system. It is a repository of knowledge.
- Some takes the form of facts and basic skills which are fixed at any given time.
- Some can be updated and learned over time.

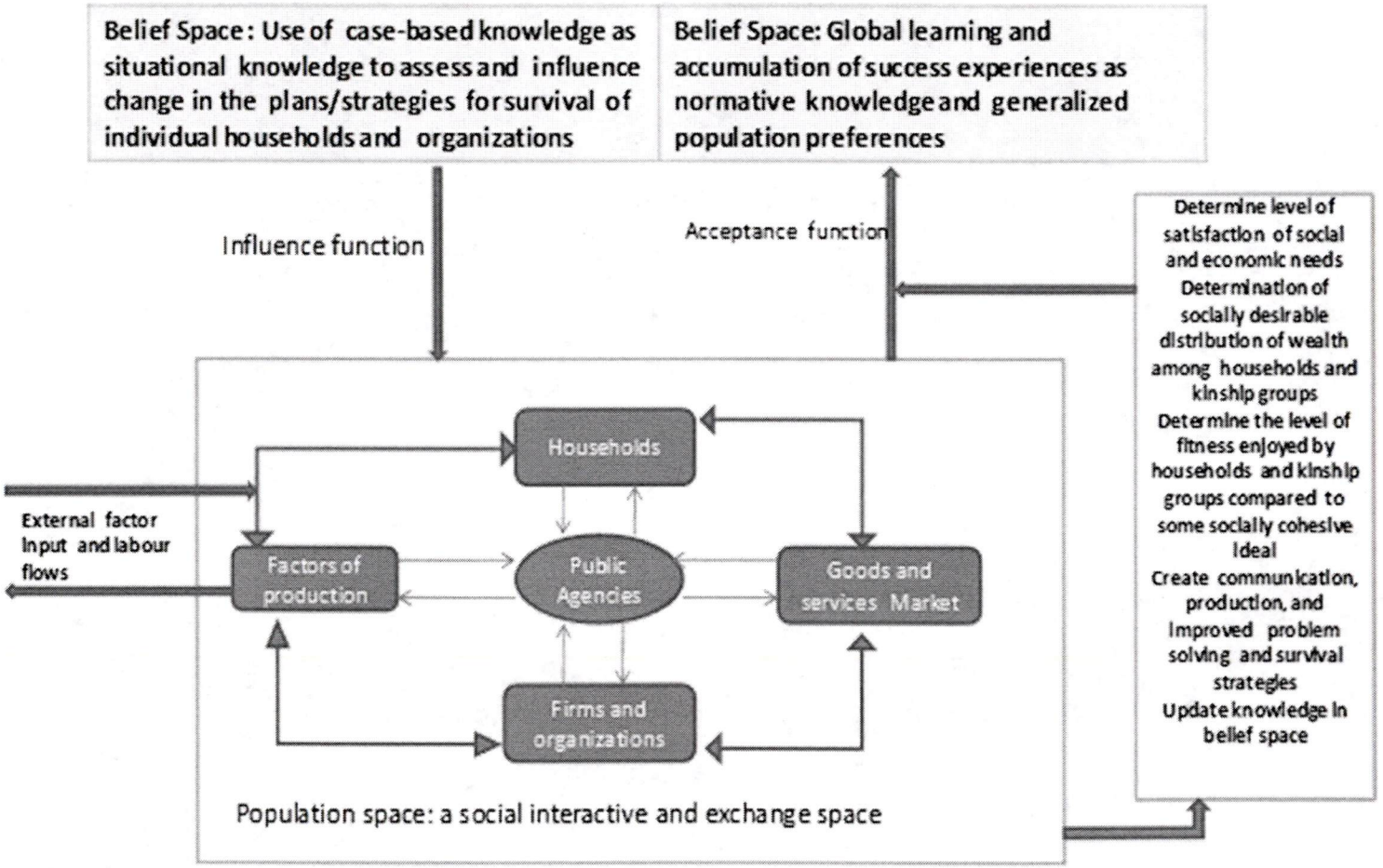
- Fixed knowledge may be topographical, temporal or historical, and the current level of skills and inventory of ingenuity in the population

- Global dynamic knowledge is generated by the collective experience (the successes and failures) of the most effective and efficient social and economic entrepreneurs, in the sub-groups and population. This is generalized knowledge accumulated in the belief space for use by current and successive generations.

Population Space

- In the population space households/agents interact and engage in a complex set of dynamic social and economic behaviours that determine the types of groups and the nature and structure of those groups; what is produced, how much, when, and where; who gets what, how much and when; and what is the socially desirable distribution of resources, goods and services.
- In this model (Diagram 1) the central purpose of population activity is the survival and reproduction of itself. The survival of the species is achieved through the innovative use of knowledge derived from the success-failure experiences of exemplars (social entrepreneurs) in the population. In its most rudimentary form the system achieves its central objective within the framework of a culture and kinship networks and a process of social entrepreneurship. In this adaptive system production is for the preservation of life and improving the fitness of the kinship and cultural groups; not for the accumulation of private profit.

Diagram 5


Belief Space: Use of case-based knowledge as situational knowledge to assess and influence change in the plans/strategies for survival of individual households and organizations
Belief Space: Global learning and accumulation of success experiences as normative knowledge and generalized population preferences
Influence function
Acceptance function
Determine level of satisfaction of social and economic needs
Determination of socially desirable distribution of wealth among households and kinship groups
Determine the level of fitness enjoyed by households and kinship groups compared to some socially cohesive ideal
Create communication, production, and Improved problem solving and survival strategies
Update knowledge in belief space
External factor Input and labour flows
Households
Factors of production
Public Agencies
Goods and services Market
Firms and organizations
Population space: a social interactive and exchange space

The Fitness Landscape

- How do we sustain life and pursue happiness in a changing hostile world made less liveable in our pursuit of happiness?
- We will draw on the concept of fitness landscape which is at the core of the new theories used to describe intelligent agent behavior in complex self–organizing adaptive (human) systems
- The landscape is an environment with a potential supporting specie life.
- We will describe the fitness landscape as an environment that offers the possibility of attaining large number fitness peaks (Maslovian pyramids of various heights) resulting from of all possible interactions and relationships within that environment:
- between species, organisms, society (social networks) , or other complex adaptive subsystems and itself.
- The landscape itself may change depending on the nature of these relationship (the structure of the interdependencies).

The Kaufman NK Landscapes

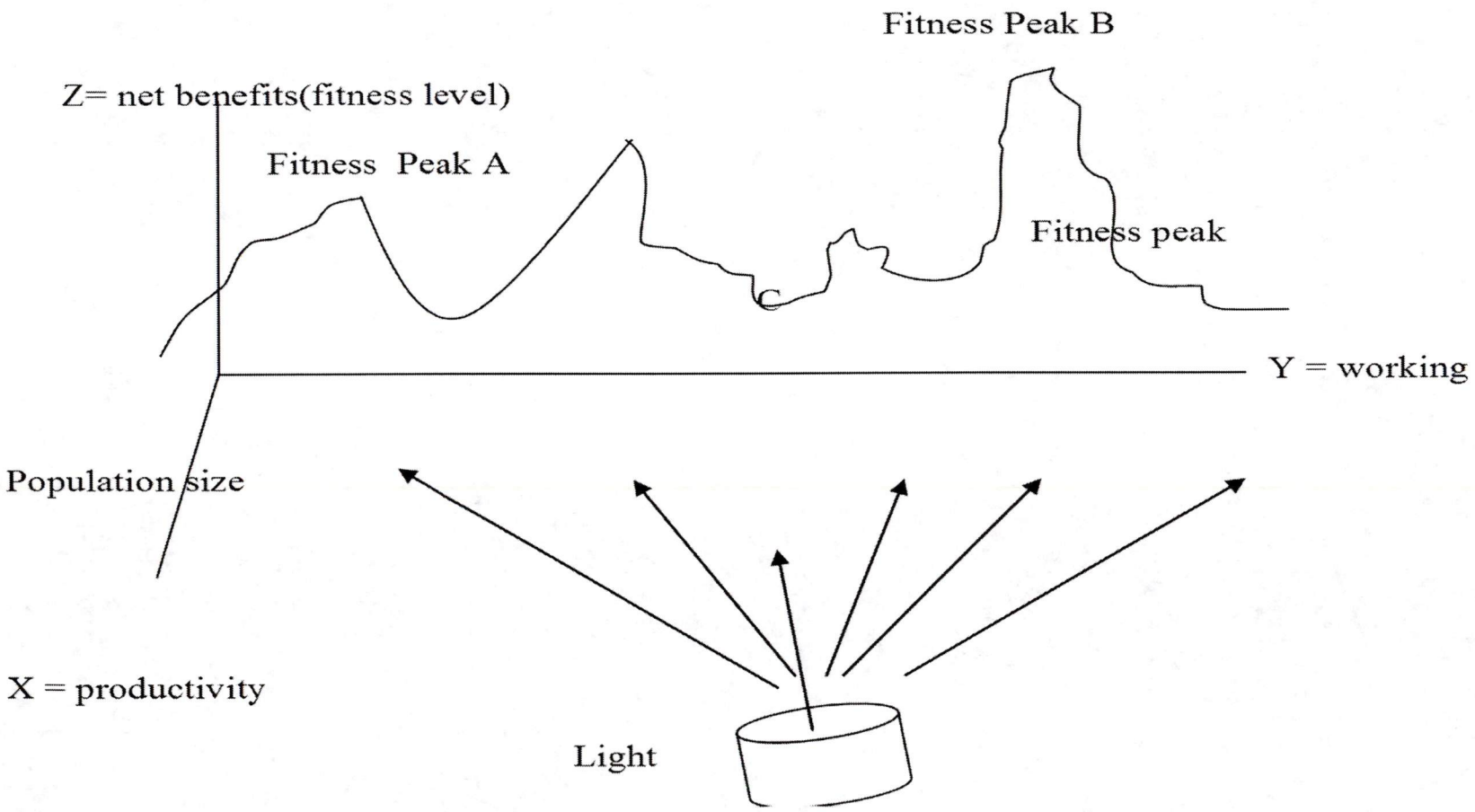
- Mathematically. suppose you are a decision maker and you are faced with having to make choices from among n different variables. Your only control is to choose Yes or No
- There are obviously different combinations of yes or no sequences that you can chose from. In fact
- Suppose that these combinations create some values Y that have utility. Then we can model the outcome values in a general way as Y = f 2^N $(X_1,\ldots,X_n)$
- Since these variables or agents all interact among themselves and with their environment Y the y produces an infinite number of potential peaks. (fitness peaks) $(X_1,\ldots,X_n)$
- This surface is in continuous dynamic change because of the interactions.
- Kauffman captures such interactions by describing landscapes in terms of their N,K properties. N is the number of 0,1 factors determining fitness, K is the number of interactions present which may range for 0 (linear and decomposable) to N-1 every variable interacts with all N-1 other variables).
- In the following diagram we use a simplified graphical for of the NK.

Simplified Fitness Contour

- Base on the Kaufman model the number of local peak = $\frac{2^N}{N-1}$
- Thus, in a complex dynamic decision making situation, the decision maker is faced with a formidable problem.

- Finding optimal fitness peaks in a landscape that is continuously changing in response to the unpredictable nature of the interactions between a large number of agents (all the factors determining fitness) in the system

Diagram 3: Fitness contour



Agents and organizational Learning Systems on the landscape

- One person institution
- Mythological learning system: informal personal networks. Knowledge embedded in myths, stories and rumours. Historical, specific, descriptive and qualitative.
- Information seeking culture: shared values, cognitive frameworks. Cultural norms constitute the learning system and filter for sharing info. Knowledge = inter-subjective; general as well as specific, communicated orally and org policies

Agents and organizational Learning Systems in the landscape (Continued)

- Participatory Learning system: network of organizational working groups. Individual member's knowledge and group decision-making norms. Knowledge specific, problem focused, current and historical. Communicated through official memos, group discussions and meetings.
- Formal Management systems: divisional and departmental systems and procedures; analytical and scientific rules for screening and disseminating info. Communication through reports and studies, comm-information network systen. Problem specific, objective, current and future oriented.

Agents and organizational Learning Systems in the landscape (Continued)

- Bureaucratic learning system. Elaborate system of operating procedures and regulations regarding the flow of information from the system. Org policies and impersonal rules determine the format. Sources and recipient of info.
- Knowledge: objective, historical, decision/task or problem oriented, communicated through written documents.

Probable Matching: Organizational Achetypes to Learning Model (Adapted from Shrivastava, Paul et al, Strategic Management Journal, Vol. 6, 897-113. 1985).

	Managerial Autocracy	Systemic Bureaucracy	Adaptiuve Planning	Political Expediency
One person institution	Good Match	Poor	Poor	Good (self seeking)
Mythological Learning system	Good match	Poor/Potential Good	Poor/Potential Good	Good
Information seeking culture	good	Poor	Good	Poor
Participative Learning System	Poor	Good	Good	Good
Formal Management System	Good match	Good	Ideal by design	Poor
Bureaucratic Learning System	good	Good	Very Possible	Decisions may Circumvent Learning system.

Rationale for the Existence of thes Architectures in a Fitness Landscape

- Professor Grandon Gill and Irena Ali provide explanations of organizational emergence and behaviors in landscapes that range in ruggedness from stable (steady state) to complicated, to complex to a state of Chaos
- Professor Grandon Gill (2012) article "Informing on a Rugged Landscape: Homophily versus Expertise." , Informing Science: the International Journal of Emerging Transdiscipline Volume 15, 2012

- Ali, I. (2011), "Coexistence or operational necessity: the role of formally structured organisation and informal networks during deployments", 16th International Command Control Research and Technology Symposium (ICCRTS), Quebec City, Canada; and
- Methodological Approaches for Researching Complex Organizational Phenoma. Insite (2013) Submission 476:

Tracking Agents in the Landscape

- Grandon Gill describe 4 general classes of agents on the landscape that embody the characteristic presented above (Shrivastava et al).
- The types were:

➢ randomized hill climbing agents that take no advice and go of on random choice rules searching for higher fitness by probing adjacent states;

➢ 2.) imitative agents who look for guidance from nearby agents; 3) expert-guided agents who are advised based on a statistically derived view of the landscape; and

➢ 4) goal-setting agents who establish goals based upon observing other clients and then steadfastly pursuing those goals regardless of intervening fitness levels.

Grandon Gill Simulations of Agents Performances on Rugged Landscape:

- In low-complexity environments, expert-guided agents match or outperform all other agent types.
- As complexity grows, however, expertise becomes fragile to the point where it can become worse than no guidance at all.
- Imitative agents and goal-setting agents—both of which engage in homophilic behaviors by design—track together until substantial levels of complexity are reached, at which point
- The goal-setting agents outperform all other agent types.

Irena Ali Research Complex Organizational Phenomena

- Ali writes ."This paper presents methodological considerations in an in-depth investigation of the complementary roles played by formal and informal structures in meeting the information and resource needs of people operating in an environment characterized by volatility, high tempo and uncertainty.
- Her approach allows us to think more explicitly of the interactions that might take place between different organizational types in order to solve problem arising out of the turbulences of rugged landscapes.
- Her methodology seem to suggest that all organizations need not change or warp into something else; but that in addition to innovation, old and new structures (architectures) must develop more flexible communication, management, and supply chain arrangements,
- In particular she investigates factors that underpin a successful interaction between the formal and informal organizational structures in such a way that will allow organizations to respond with agility to uncertain and changing operational environment, and to understand the role informal networks play in this organizational dynamic.

The Cynefin Sensemaking Framework

- We borrow the Cynefin sensemaking framework as an analytical tool for describing different circumstances of the operating environment, for describing activities of individuals in that environment, for mapping the path of activities as the circumstances change, and for explication the interactions between the formal organization and informal networks.
- The Cynefin framework allows us to use narrative (and descriptive approaches) for understanding complexity and the social aspects of sensemaking while taking into consideration various environmental circumstances.

FIVE DOMIANS

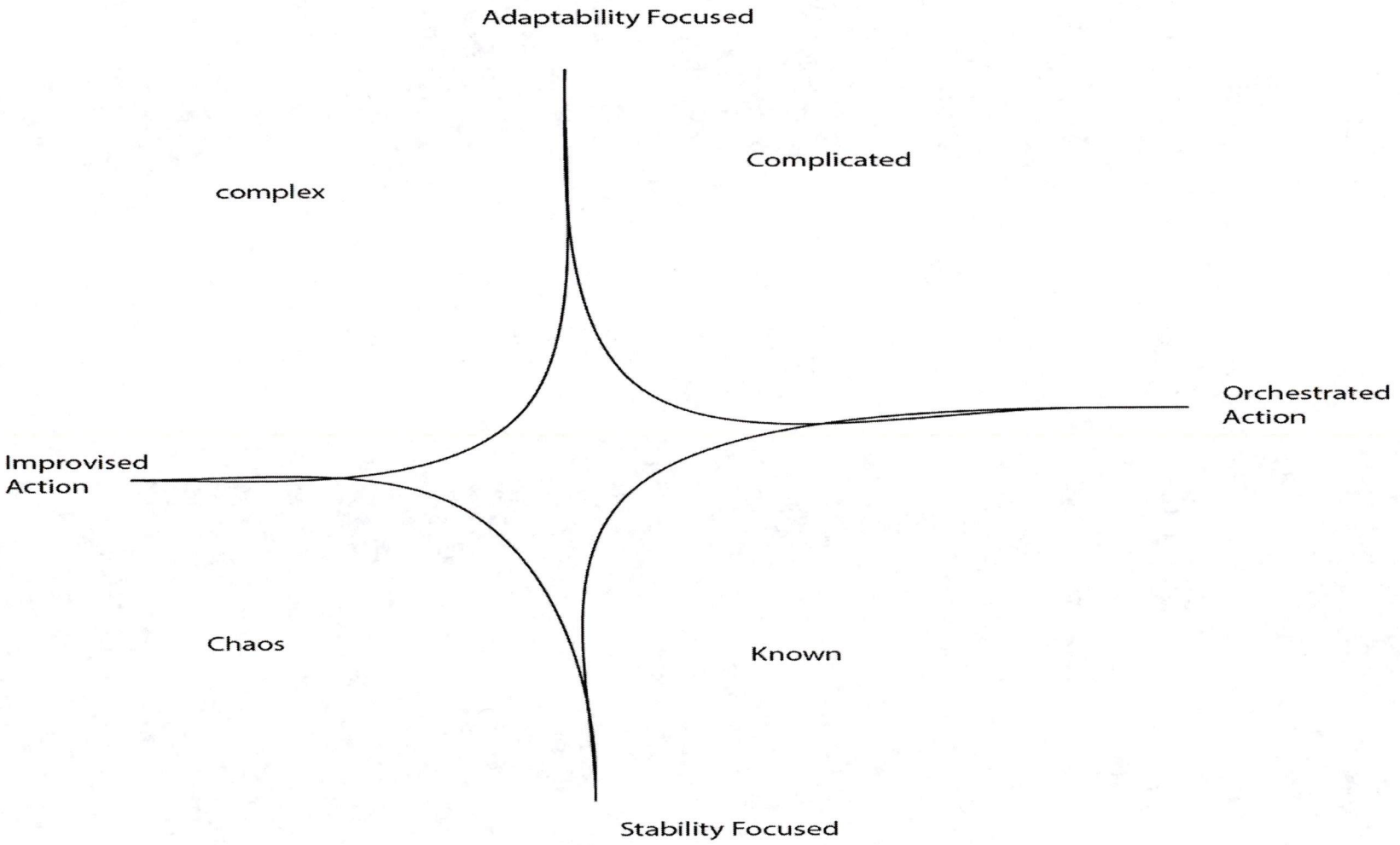
- The Known1, or Simple – characterized by stability and clear relationship between cause and effect. 167 Simple contexts, once properly assessed, require straightforward management and monitoring. The 168 approach is to Sense - Categorize – Respond (SCR). This suits a vertical way of working with weak 169 horizontal links and adherence to best practices is appropriate
- The Knowable, or Complicated - in which the relationship between cause and effect requires analysis, 171 often leading to several options, and/or the application of expert knowledge. The approach is to Sense - 172 Analyze – Respond (SAR). In such an environment vertical and horizontal links need to be strong and 173 good practice rather than best practice, is more appropriate.
- The Complex, or domain of Emergence - in which the relationship between cause and effect can only be 175 understood in retrospect. Emergent patterns can be perceived but not predicted. The approach 176 therefore, is to Probe - Sense – Respond (PSR) and then allow emergent practice. There are no 'right' 177 answers and the need for increased levels of interaction and communication as well as creative and 178 innovative approaches is greater. In this domain, the horizontal connections between individuals ideally 179 need to be strong with weak vertical connections

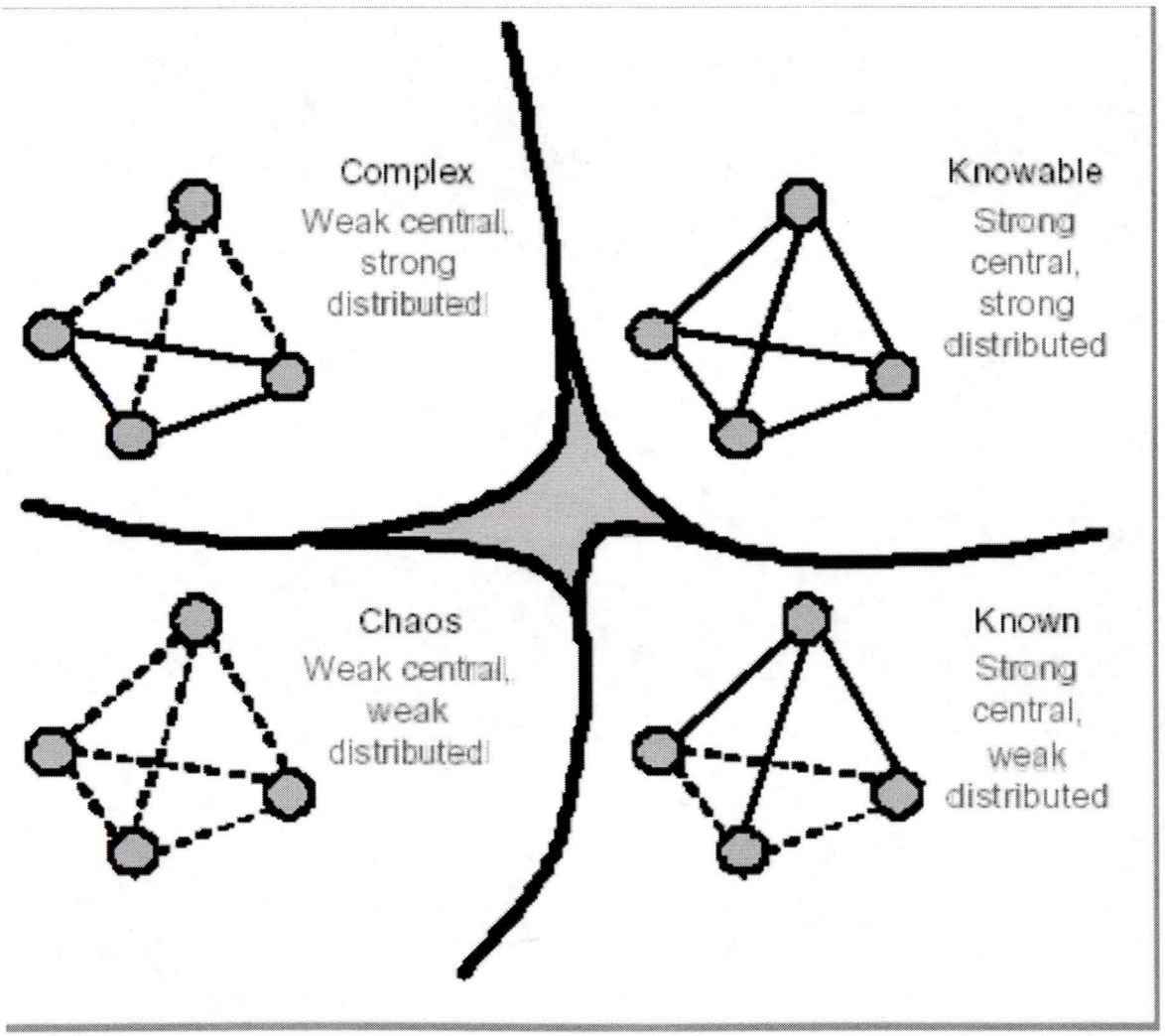
DOMAINS CONTINUED

- The Chaotic, or domain of rapid response - there is no visible relationship between cause and effect at system level and no time to investigate or ask for input. Therefore, reducing turbulence and establishing order is important, and then sensing where stability is present and where it is not, i.e. sense reaction to initial intervention, and then respond by transforming chaos into complexity where patterns can

- emerge. Top-down or broadcast communication is imperative in those situations. The overall approach, therefore, is to Act - Sense – Respond (ASR). The connections between individuals in this domain should be weak or non-existent.
- Disorder (the central shaded area) – a destructive state of not knowing what type of relationship exists between cause and effect. In this domain decision-makers interpret at the same situation from their own disposition to act and they will often revert to their own comfort zone in making a decision or conversely; it is a state of decision paralysis.

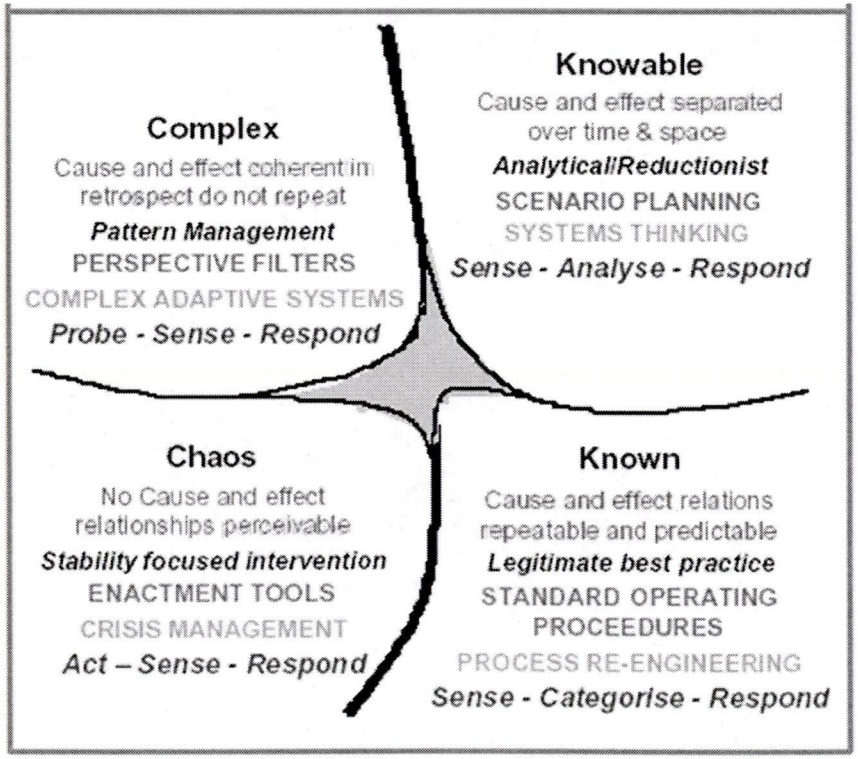
Organizational /Agent Action Strategic Focus and External Environment



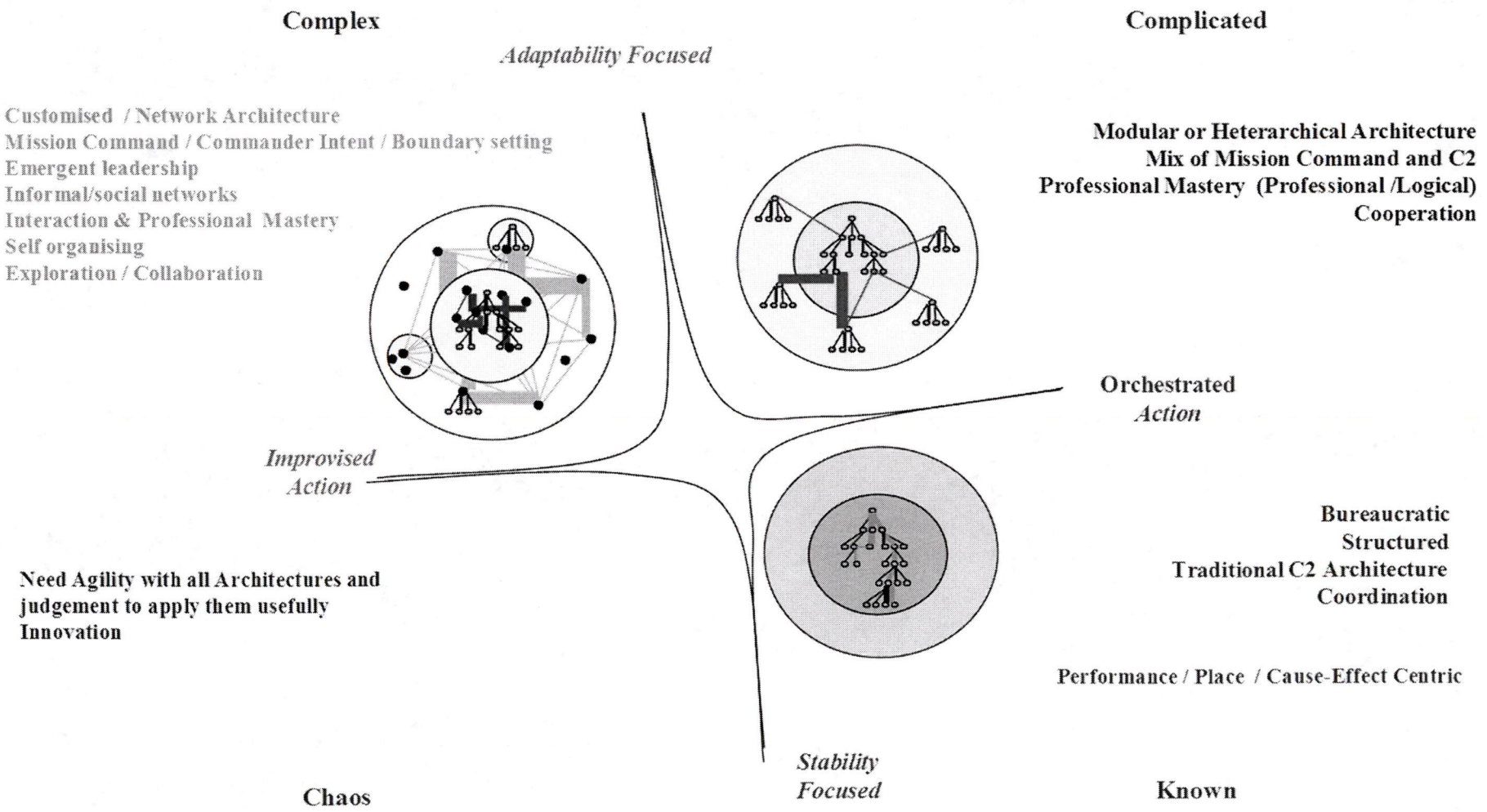

Complex
Weak central,
strong
distributed
Knowable
Strong
central,
strong
distributed
Chaos
Weak central,
weak
distributed
Known
Strong
central,
weak
distributed

Complexity-Cynefin Framework

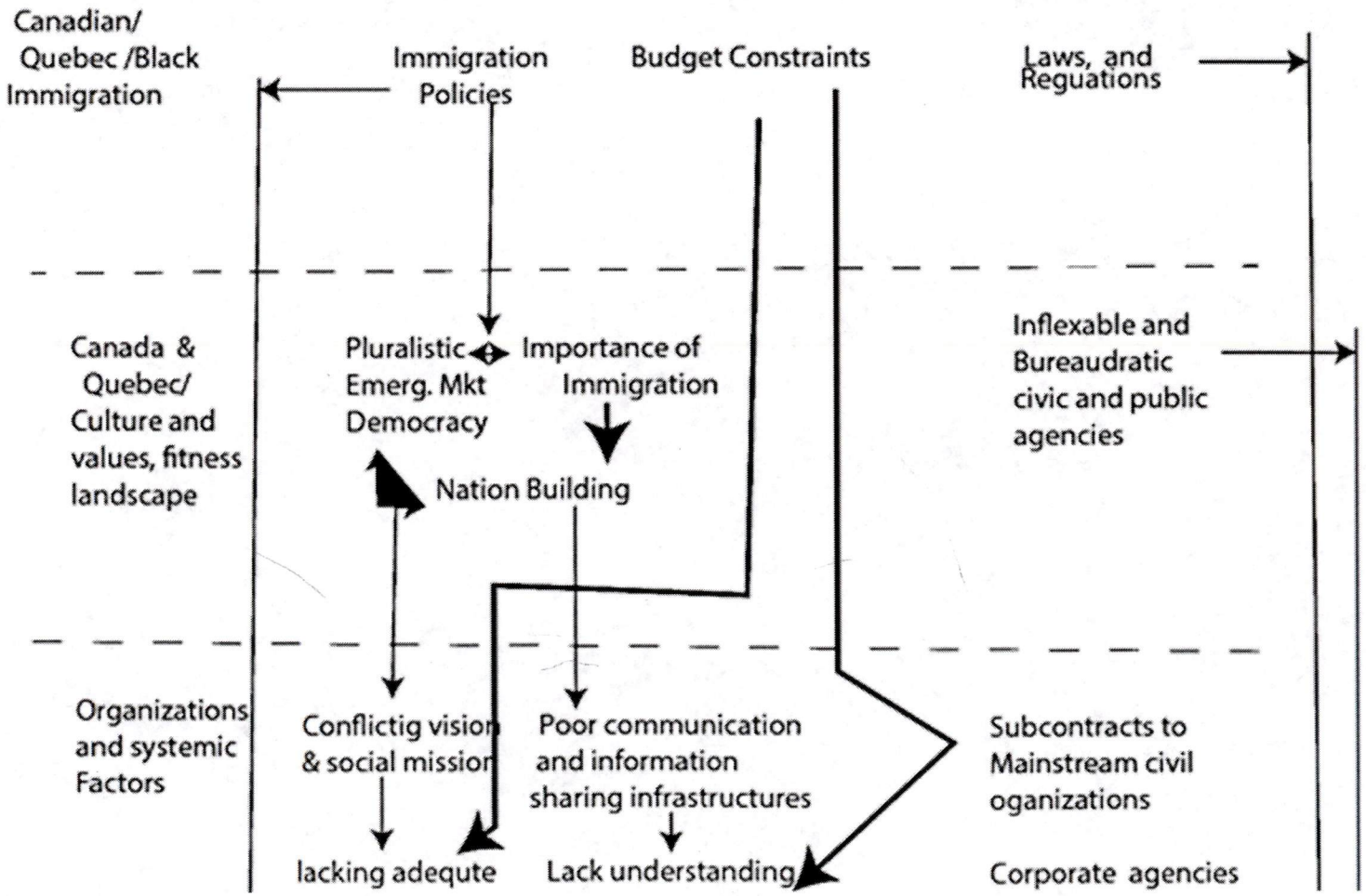
borrowed from Irena Ali, Coexistence or operational necessity: the role of formally structure organization and informal networks during deployment Defence Department Australia, 2007

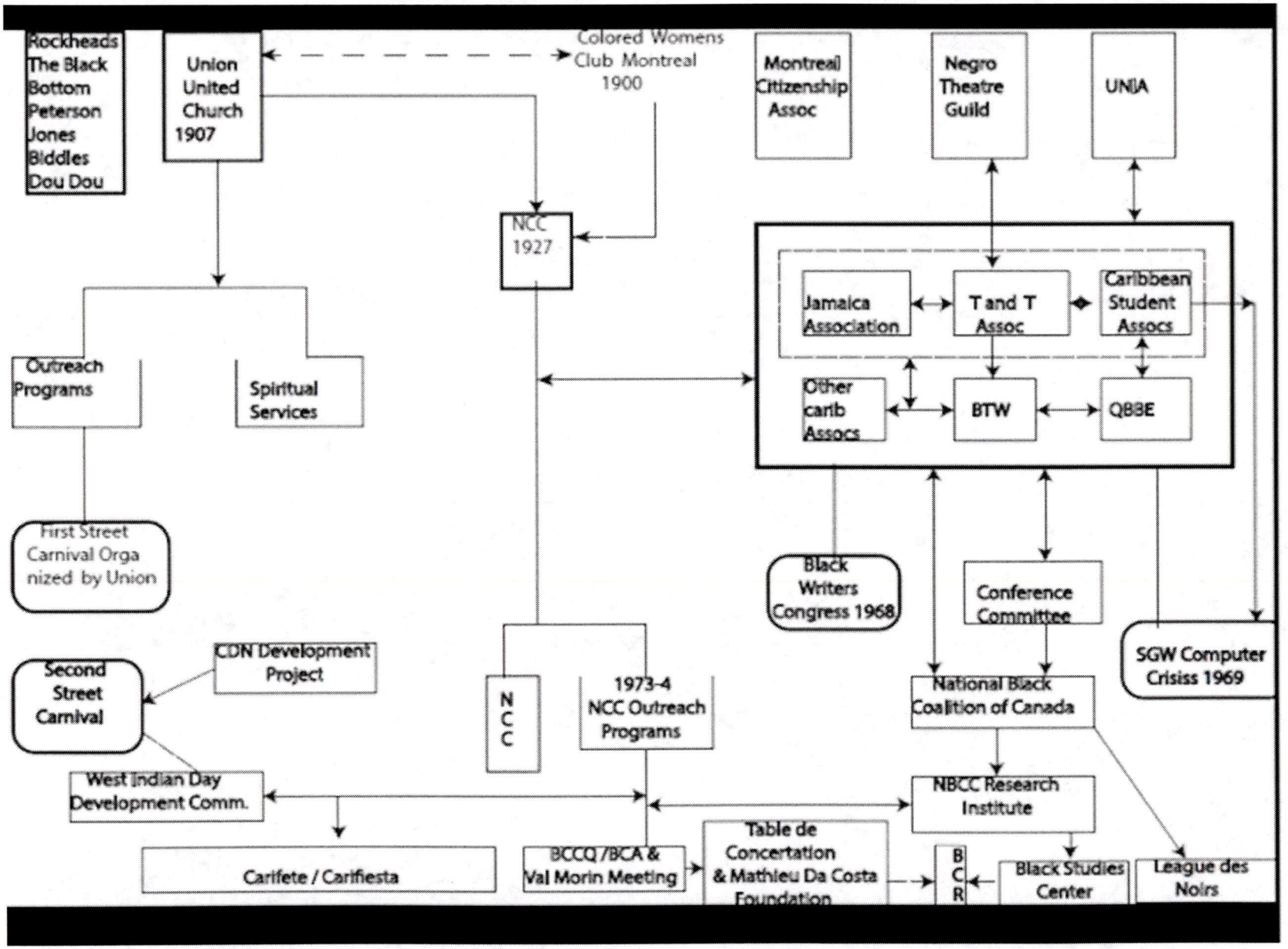


Summary - Organisational Architecture & External Environment



A MAPPING OF ADAPTIVE SYTEM AT WORK : EXPLORING MINORITY FITNESS




Rockheads
The Black
Bottom
Peterson
Jones
Biddles
Dou Dou
Union
United
Church
1907
Colored Womens
Club Montreal
1900
Montreal
Citizenship
Assoc
Negro
Theatre
Guild
UNIA
NCC
1927
Jamaica
Association
T and T
Assoc
Caribbean
Student
Assocs
Other
carib
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QBBE
Outreach
Programs
Spiritual
Services
First Street
Carnival Orga
nized by Union
Black
Writers
Congress 1968
Conference
Committee
SGW Computer
Crisiss 1969
Second
Street
Carnival
CDN Development
Project
NCC
1973-4
NCC Outreach
Programs
National Black
Coalition of Canada
West Indian Day
Development Comm.
NBCC Research
Institute
Carifete / Carifiesta
BCCQ /BCA &
Val Morin Meeting
Table de
Concertation
& Mathieu Da Costa
Foundation
B
C
R
Black Studies
Center
League des
Noirs

Summary

- The cases presented above illustrate the role played by social entrepreneurs, social organizations, networks of individuals, alliances committed to correcting the poverty lived by Blacks under a persistant "colour line."
- Besides the gains in fitness resulting from major increases the Black population, internally it became important to create self esteem through self-definition rooted in a sense of origin and purpose, fuller participation in the creation of an emerging Canadian cultural landscape.
- Hence their ardent support of the Trudeau/liberal concept of the just society, and multiculturalism which allows cultural groups to survive in their spiritual spaces as opposed to just physical and gene-life spaces.

Summary Continued

- In Montreal or Quebec, there is no name such as Martin Luther King, or Malcom X or Marcus Garvey that jumps out of the bag of leaders, because the search has been one involving in many instances spontaneous arrangements and meetings of sub-groups of persons. The principle of operations of self-organizing agencies explains the outcomes.

- In addition to equality under the law, they have in collaboration with other cultural groups advocated for the retention of their culture and culture and language specific services

Policy Implications

- Cultural groups must continue to develop organizations and programs that increase their access to greater education resources and skills training essential to their survival, reproduction and the sustaining of a satisficing quality of life for members of their communities
- where the fitness of the National and or Provincial populations is being ensured/strengthened by immigration, public/government agents should put emphasize on families and maintain male-female ratios that correct National and regional imbalances in the reproduction rates.

- There is a need to close gaps in communication and information flows across the entire landscape. This will speed up the rate with which groups that have ingenuity gaps reduce those inefficiencies and find alternative and hopefully higher levels of fitness

Policy Implications Continued

- Thus organizations must be encouraged to set up improved communication network systems to assist in the effective gathering of information, updating and dissemination of knowledge.
- They must engage in greater communication and collaboration across kinship and cultural groupings
- given the collective multicultural and inter-cultural state policy, they must take responsibility for the creation of the culture artifacts that partially reflect their fitness as a subgroup in the population space.
- all groups must be constantly aware of changes in the fitness landscape and adjust their programs and actions to reflect those changes as best as is possible.
- build into their operations feedback mechanisms that allow them to constantly use updated information from informal community networks into their strategic planning cycles; and reengineer their organizations to harness and employ the social and human capital in the communities they represent.